3.20 inches at Campden Hill, Kensington, and 3.37 inches at Barrow Hill, north of Regent's Park. Such falls in a short period have only been exceeded in the London area, so far as Dr. Mill has been able to ascertain, by 3.42 inches at Blackheath on July 23, 1903, and by 3.90 inches at Hampstead on April 10, 1878. On June 23, 1878, Mr. Symons recorded at Camden Square a fall of 3.28 inches in about an hour and a half; on Saturday last the recording gage showed that 2.86 inches fell in 2 hours, and no heavier rain has been recorded at Camden Square in the 39 intervening years.

GREATEST 24-HOUR RAINFALL AT WASHINGTON, D. C.

It is interesting to compare with these very exceptional falls under London's conditions, the following equally exceptional falls under Washington conditions, compiled by Mr. Herbert Lyman from the records of the Washington office of the Weather Bureau.

Greatest rainfalls for any 24 hours at Washington, D. C.

Inches.	Date.	Remarks.
5.80	1878, July 29–30.	
5.66	1874, Sept. 15–16.	
5.00	1904, Sept. 14–15.	
4.96	1898, Aug. 12.	
4.22	1905, July 5–6.	3.26 inches fell in 1h 13m.
4.16	1886, June 22.	
4.12	1876, July 30.	
3.98	1877, Oct. 4.	
3.92	1905, Aug. 25.	
3.67	1910, Oct. 19–20.	Not a thunderstorm fall.
3.50	1886, May 7–8.	
3.48	1900, June 2.	3.04 inches fell in 1h 8m.
3.34	1886, July 26–27.	
3.27	1917, July 25.	1.90 inches fell in 1h.

To this table must be added the remark that in 1906 2.46 inches fell within 56 minutes on August 24.—C. A., jr.

551.51 (048)

REVOLVING FLUID IN THE ATMOSPHERE.[1]

By Sir NAPIER SHAW.

[*Abstract* of an address before the Royal Society, June 21, 1917.]

It is generally assumed, as appears prticularly from a recent paper by Lord Rayleigh,[2] with reference to a former paper by Dr. J. Aitken, that the motion of air in cyclones and anticyclones may be classed as the motion of revolving fluid, symmetrical about a vertical axis. Reasons are given to show that this assumption with regard to cyclones and anticyclones of middle latitudes is erroneous; that circular isobars on the map do not indicate revolving fluid, and, vice versa, that traveling revolving fluid would not be indicated by a system of circular isobars. The next point for consideration is how a mass of revolving fluid traveling with a speed of translation of the same order as the speed of rotation, and of sufficient size, would be represented on a map. Diagrams are drawn showing the distribution of velocity in four cases for different ratios of the velocity of translation to the velocity of rotation, and assuming that systems of velocities could be fitted to pressure lines of the same shape, it is inferred that cases of traveling revolving fluid would be indicated by isobars similar to those which are classed meteorologically as belonging to small secondaries, or distortions of the isobars, generally on the southern side of the great cyclonic systems. Conditions are next considered which must exist if a column of rotating fluid is maintained and transported within a current represented by the isobars of a great cyclonic depression. The conditions arrived at are briefly: (1) That the velocity of translation must be the velocity corresponding with the separation of the isobars of the main depression unaffected by the presence of the revolving mass. (2) The column must probably extend throughout the troposphere, otherwise it could not be "capped." (3) The velocity of the current transporting the revolving fluid must be the same at all heights. This condition is shown to be satisfied if the line of lapse of temperature with height in the atmosphere corresponds with an adiabatic line, and this is known to be approximately the case in a cyclonic depression where convection has been ubiquitous and vigorous.

[1] *Reprinted from* Nature, London, July 5, 1917, 99:378.
[2] Abstract published in this REVIEW August, 1917, pp. 413–414.—C. A., jr.

MOTION OF A PARTICLE ON THE SURFACE OF A SMOOTH ROTATING GLOBE.[1]

By F. J. W. WHIPPLE.

[*Reprinted from* Science Abstracts, Sect. A, Aug. 30, 1917, § 721.]

The free motion of a particle over a smooth rotating globe has not in the past received much attention, but the author considers that a knowledge of the motion of such a particle will prove a useful preliminary to a proper understanding of the more complicated motion which actually occurs in winds, where the air particles have other forces besides that of gravity acting upon them. After briefly dealing with the case of a particle on a smooth rotating sphere, the case of a globe having a "level" surface is considered. During the motion over the surface the relative speed remains constant. If the velocity is small so that variation in latitude is negligible the track is a circle and the period of the motion relative to the surface of the globe $\frac{1}{2}$ cosec ϕ days (where ϕ = latitude.)

Where variations of latitude must be taken into account the general equations are worked out, but before a complete solution can be found it is necessary to assume that ϕ is small throughout the motion. The equations are thus approximate only and must not be used for high latitudes. The solution then falls into 3 classes according as constant C is positive, zero, or negative. The value of C is governed by the initial motion and starting point of the particle.

The results are illustrated by curves which show the motion of a particle given the velocity of 10 m./sec. over a globe having the dimensions of the earth. The first set of curves (C positive) give oscillatory paths backward and forward across the equator. In the second set ($C=0$) after a looped path the particle approaches the equator asymptotically. In the third case (C negative) motion is confined to one side of the equator. An approximately circular path is followed out, but with a gradual drift to the westward.—*J. S. Di[nes]*.

MOTION OF THE AIR IN THE LOWEST LAYERS OF THE ATMOSPHERE.[2]

By G. HELLMANN.

[*Reprinted from* Science Abstracts, Sect. A, Aug. 30, 1917, § 732.]

From measurements of the wind velocity at five different heights up to 258 meters above the ground at the

[1] Philosophical Mag., London, June, 1917, 33:457–471.
[2] Berichte, Preuss. Akad. Wiss., Berlin, 1917, 10:174–197.

German wireless telegraph station at Nauen, the law is deduced that wind velocities at different heights vary as the fifth-roots of the heights. At 512 meters the velocity is twice that at 16 meters. The diurnal variation of wind velocity at the surface with a maximum in the afternoon extends in winter only to a height of about 60 meters above the ground. Above that height the opposite type of variation is found, with a maximum in the night. The neutral zone between the two types is considerably higher in the Summer, probably at about 300 meters.—*R. C[orless.]*

551.55 (048)

THE RELATION BETWEEN PRESSURE-GRADIENT, WIND, AND FRICTION IN STEADY MOTION.[1]

By F. ÅKERBLOM.

[*Reprinted from* Science Abstracts, Sect. A, Aug. 30, 1917, §731.]

On the assumption that motion of the air near the earth's surface could be treated like the steady motion of a particle, Guldberg and Mohn developed simple equations connecting wind velocity with horizontal pressure gradient, latitude, air density, and friction. In forming the equations it was assumed that friction acted in a direction opposed to that of the surface wind. Comparison with observations, however, showed that the equations were inapplicable to surface winds in the interior of continents, that coastal winds conformed more nearly with them, while observations at a single station at sea gave satisfactory agreement with them.

The author introduced the conception of friction acting in a direction different from that of the surface wind reversed, on the ground that the upper wind, which affects the surface wind by friction as well as the ground, usually differs in direction from that wind. Comparison with observations in Europe, America, and over the North Atlantic gives values of the angle between the direction of friction and the reversed direction of the surface wind which vary from 30° to 60° and are slightly greater over sea than over land. Over land the angle appears to show a maximum in the early afternoon and a minimum at night.—*R. C[orless.]*

551.576 (048)

THE FORMATION OF ANTICYCLONIC STRATUS.[2]

By C. K. M. DOUGLAS.

[*Reprinted from* Science Abstracts, Sect. A, Aug. 30, 1917, §727.]

The clouds here termed stratus, which include those of the stratus-cumulus type, are found, by observation from an aeroplane, to have an adiabatic temperature gradient below them and a reversed gradient above them. Within the cloud the gradient is usually adiabatic, and there is considerable turbulence. On the north and east sides of anticyclones there is nearly always a layer of stratus or of haze with cloud patches. The height of the layer varies between 3,000 and 6,000 feet. It is pointed out that stratus may be formed by the adiabatic compression of nonhomogeneous cloudy air, the layers of cloud where there is initially most free water present becoming less warmed than the layers above and below after the water has evaporated from these, and so giving rise to the reversed gradient above the remaining layer of cloud. A reversed gradient may also be formed at any layer above which there is a pronounced increase of westerly wind, this westerly current being normally warm and tending to raise the temperature at its level. By the use of a formula put forward by Napier Shaw it is demonstrated that this is particularly likely to happen on the northern sides of anticyclones at any height where there is initially a smaller vertical temperature gradient than normal, the tendency being for this abnormality to become accentuated.—*J. S. Di[nes.]*

[1] Ark. för Mat., astron., och fysik, Stockholm, 1916, 11, No. 18. 19 p.
[2] Proc., Roy. Soc., Edinburgh, 1916-17, 37:137-148.

22430—17——2

WINDWARD ISLANDS VS. LEEWARD ISLANDS.

The Washington office of the United States Weather Bureau recently received a query from our observer at Basseterre, St. Christopher, British West Indies, concerning the exact scope of the terms Windward Islands and Leeward Islands when used in the cabled storm warnings of this bureau. As the Weather Bureau is now

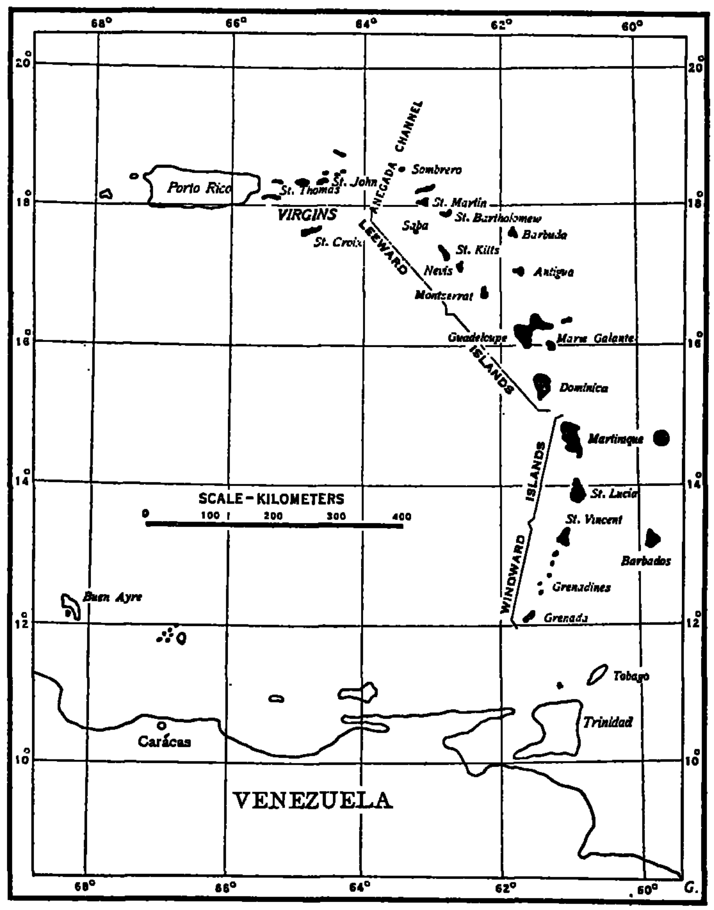

FIGURE 1.—Sketch map outlining the Windward and the Leeward Islands as now defined.

engaged in extending its network among the islands of the West Indies, and probably will soon begin to make numerous references to the islands, this question is one of considerable immediate interest. In view of the somewhat confusing usage in existing atlases it seemed desirable to submit the question to the United States Geographic Board for a statement as to the preferred usage, the following was received in reply:

UNITED STATES GEOGRAPHIC BOARD,
Washington, D. C., Oct. 16, 1917.

Prof. CHARLES F. MARVIN,
Chief of Weather Bureau.

DEAR SIR: In reply to your inquiry of 9th inst., I have to say that considerable confusion has existed as to the application of the names "Windward Islands" and "Leeward Islands." Originally the name